e 270 C. S. Crandall

DECEMBER, 1909 BULLETIN 270

CORNELL UNIVERSITY

AGRICULTURAL EXPERIMENT STATION OF

THE COLLEGE OF AGRICULTURE

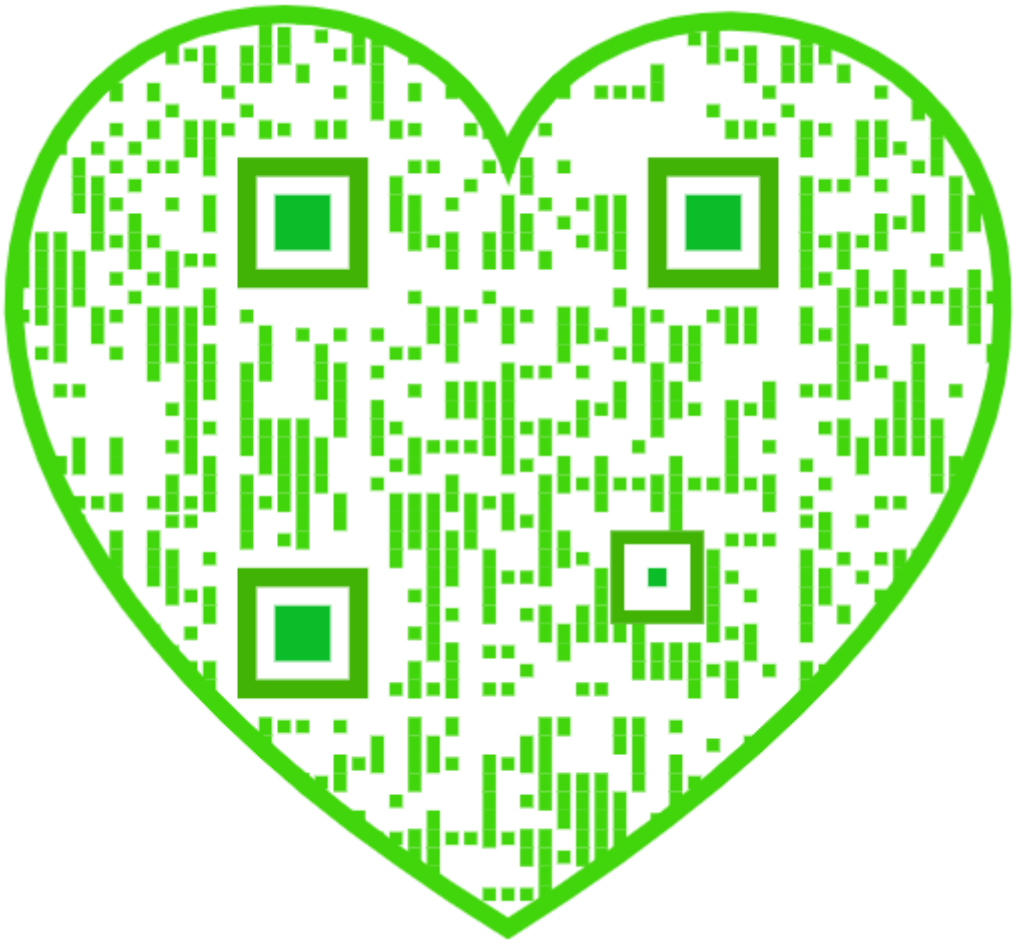
Department of Dairy Industry (Extension Work)

FANCY CHEESES FOR THE FARM AND FACTORY

Circulating copy
Agricultural Libra

By C. A. PUBLOW

ITHACA, N. Y.
PUBLISHED BY THE UNIVERSITY



ORGANIZATION

Of The Cornell University Agricultural Experiment Station

BOARD OF CONTROL

THE TRUSTEES OF THE UNIVERSITY

THE AGRICULTURAL COLLEGE AND STATION COUNCIL

JACOB GOULD SCHURMAN, President of the University.
ROBERT H. TREMAN, Trustee of the University.
LIBERTY H. BAILEY, Director of the College and Experiment Station.
EMMONS L. WILLIAMS, Treasurer of the University.
JOHN H. COMSTOCK, Professor of Entomology.
HENRY H. WING, Professor of Animal Husbandry.

EXPERIMENTING STAFF

LIBERTY H. BAILEY, Director.
HERBERT J. WEBBER, Acting Director.
ALBERT R. MANN, Secretary.
JOHN HENRY COMSTOCK, Entomology.
HENRY H. WING, Animal Husbandry.
JOHN CRAIG, Horticulture.
T. LYTTLETON LYON, Soil Technology.
BENJAMIN M. DUGGAR, Plant Physiology.
JOHN L. STONE, Farm Practice.
JAMES E. RICE, Poultry Husbandry.
GEORGE W. CAVANAUGH, Chemistry.
ELMER O. FIPPIN, Soil Technology.
WILLIAM A. STOCKING, Jr., Dairy Industry.
HERBERT H. WHETZEL, Plant Pathology.
GEORGE F. WARREN, Farm Management.
GLENN W. HERRICK, Entomology.
LOWELL B. JUDSON, Horticulture.
CHARLES S. WILSON, Pomology.
HOWARD W. RILEY, Farm Mechanics.
MERRITT W. HARPER, Animal Husbandry.
JAMES A. BIZZELL, Soil Technology.
CHARLES A. PUBLOW, Dairy Industry.
CYRUS R. CROSBY, Entomology.
CLARENCE A. ROGERS, Poultry Husbandry
PAUL J. WHITE, Farm Crops.
DONALD REDDICK, Plant Pathology.
HAROLD E. ROSS, Dairy Industry.
HARRY. H. LOVE, Plant-Breeding.
ARTHUR W. GILBERT, Plant-Breeding.
CHARLES F. CLARK, Plant-Breeding.
EDWARD R. MINNS, Farm Practice.
[illegible]MER S. SAVAGE, Animal Husbandry.

[illegible]ns of the Station are sent free to persons residing in New [illegible] them.

630.7
N48cb
no.270
cop.4

FANCY CHEESES FOR THE FARM AND FACTORY

While fancy cheesemaking is in some ways an ancient practice, it is a branch of the dairy industry that is rapidly becoming very important, and it is doubtful whether any other branch offers so great a field for profit. During the past year, the Department of Dairy Industry of the New York State College of Agriculture has made a study of a few of the most common American varieties that can be made most easily and satisfactorily on the farm or in the factory. Some of this information is already available in book form, but many of the directions commonly read are either too brief, inaccurate or entirely misleading.

The number of requests coming to us from dairymen for information on the making of these soft or fancy cheeses has been great and is rapidly increasing. It is for the purpose of furnishing this information that this bulletin has been prepared. Only important and profitable varieties have been experimented with, the idea being to secure information of value in aiding manufacturers to prevent or overcome defects in their product and to insure a more uniform quality. Particular attention has been given to the effects of changes in temperature and acidity. In this latter work, the use of the acidimeter has been most valuable. A great volume of detailed results is omitted from this publication, and we give only directions which have proved of best service in our work and which can be accurately and easily followed by the cheesemaker. Practical directions are given for the making of each variety, together with a number of precautions and suggestions for preventing and overcoming defects in the quality of each.

COTTAGE CHEESE

In America, cottage cheese is manufactured more extensively than any other variety of soft cheese made from skimmed milk. A considerable amount is used on the dinner table, but the great bulk of it is used by bakers in the preparation of fancy cheese biscuits. For this reason it is often called baker's cheese.

Method of manufacture. Cottage cheese is the product obtained by the precipitation of the solids of skimmed milk or buttermilk. This precipitation can be accomplished in several ways: (1) by the development of lactic acid; (2) by the addition of other acids (contrary to law in New York State); (3) by the addition of rennet; (4) by a combina-

tion of any two of these. The most desirable method is a combinatio of one and three, viz., the development of lactic acid by the use o a commercial starter or buttermilk and by the use of rennet. A com mercial starter is simply a culture of lactic acid forming bacteria, and can be secured from any of the dairy supply houses.

Skimmed milk as it comes from the separator is cooled to 75° Fahr. or the milk may first be pasteurized at 165° Fahr. for 15 minutes and then cooled to 75° Fahr. Then a sufficient quantity of commercial starter or buttermilk is added. The amount of starter depends on the acidity of the milk, the temperature of the milk, the acidity of the starter, and the time allowed for coagulation. When milk is separated in the morning, it should be ready for the addition of rennet early in the afternoon. The acidity should be not over .22% when rennet extract is added at the rate of one-half ounce per 1,000 pounds of skimmed milk, over-acid milk causing defective texture and flavor in the cheese. Coagulation usually takes place in a few hours, but the milk should be left undisturbed and kept at 75° Fahr. until the following morning when the curd will have begun to separate from the whey. The acidity at this time should be not over .7%. The curd is then scooped onto a large strainer-rack or placed in cotton bags to drain. The expulsion of whey can be hastened greatly by the use of a cheddar cheese press. When all free whey has escaped the curd is packed in milk cans and is ready for shipment. This product is commonly called "baker's cheese."

When cottage cheese is manufactured in small quantities for table use it is prepared somewhat differently. After the curd is sufficiently dry, salt is added at the rate of two ounces to ten pounds of cheese. The cheese is then pressed into round balls or fancy shapes, weighing one-fourth pound to one pound and wrapped in oiled paper. One hundred pounds of skimmed milk will make about 22 pounds of baker's cheese, which sells for 1½ cents to 2½ cents per pound, or about 18 pounds of finished cottage cheese which usually retails at 5 to 20 cents per pound, depending on the quality of the cheese and the manner and style in which it is marketed.

Qualities of cottage cheese. Perfect cottage cheese should be clean in flavor, resembling fresh butter. The taste should be mildly acid. The texture should be entirely free from lumps or grittiness. Cottage cheese will keep in good condition for two weeks if kept in a cold place.

Composition of cottage cheese.

Water	72%
Proteids	20%
Sugar, lactic acid, etc	5.5%
Ash	2.5%
	100.0%

Defects in cottage cheese—causes and remedies.

1. *Defects in flavor.*

Unclean, bitter, acidy, and food flavors are the important ones.

(a) *Causes.*

(1) Bacteria, which gain entrance in one or more of the following ways:

(a) Unclean milk supply.
(b) Unclean utensils.
(c) On dirt carried by flies.
(d) Impure starters.
(e) Development of acid.

(2) Flavors of strong smelling foods which the cows have eaten.

(b) *Remedy.* It is practically impossible to make the cheese any better than the milk-supply. Many undesirable flavors can be avoided, however, by pasteurizing part or all of the skimmed milk and ripening with a good commercial starter.

2. *Defects in texture.*

A. The most common defects are dry, mealy and lumpy texture.

(a) *Causes.* Too little moisture or an uneven incorporation of moisture in the cheese, due to one or more of the following causes:

(a) Too high or uneven temperature during the manufacturing process. This usually occurs in cold weather in buildings where the temperature cannot be controlled.
(b) Over-development of acid.
(c) Too rapid drying or uneven drying.
(d) Use of too much rennet.
(e) Uneven coagulation.

(b) *Remedy.* If uniform results are to be obtained the temperatures and acidity must be uniformly controlled. In cold weather the building should be warm. The use of an acidimeter affords an accurate means of determining the amount of acid at all times, and when this is known the development can be controlled by raising or lowering the temperature as desired. Lactic acid forms most rapidly at 90° Fahr., and as this temperature is lowered the growth of lactic acid forming bacteria is checked proportionally. An important fact to remember is that the lower the temperature and still have a proper coagulation, the smoother will be the texture.

B. Soft, pasty or mushy texture.

(a) *Causes.* Too much moisture in the cheese, due to one or more of the following conditions:

(a) Too low temperature of coagulation.
(b) Imperfect coagulation.
(c) Insufficient drying.

(b) *Remedy.* The precautions given under dry texture apply here as well.

The great secret of successful cottage cheesemaking lies in the proper controlling of temperature, acidity and moisture during the entire manufacturing process. A high moisture content means more whey and therefore more milk sugar, and subsequently a greater and more rapid formation of acid. In dry cheese the formation of acid is slower.

NEUFCHATEL CHEESE

Neufchatel cheese was originally a French make of soft molded cheese. In this country the process of manufacture has been considerably changed, so that the cheese as now manufactured represents a somewhat different type, that is ready for use as soon as made.

Foreign method of manufacture. Fresh milk is set at 85° Fahr., with sufficient rennet to cause a thorough coagulation in 24 to 36 hours. The curd is then placed in cheese-cloth bags and allowed to drain for some 12 to 24 hours. The draining is assisted by the application of light pressure. When the curd is dry enough it is pressed into cylindrical shapes $1\frac{3}{4}''$ x 3″, and salted from the outside. It is then allowed to drain for several hours, and is placed in a ripening room where in a few weeks it becomes covered with white and blue mold. The cheese is then placed in a cellar for further ripening, and when red spots appear on the outside it is wrapped in paper and tinfoil and marketed.

American method of manufacture. Fresh sweet milk is heated to 165° Fahr. for 10 minutes and then cooled immediately to 72° Fahr. Until very recently, the milk used was not pasteurized, but the great difficulty in securing reliable milk, together with the advantages of pasteurization and the use of a commercial starter, have made the heating method very popular.

In large factories the cheese is made in large vats, but on the farm it can be made in smaller quantities in shot-gun cans holding about 30 pounds of milk. After the milk is cooled to 72° Fahr., a small amount of commercial starter is added and enough rennet to insure a thorough coagulation in 18 hours. Usually about 1 c.c. of commercial starter and ½ c.c. of rennet extract is sufficient to 30 pounds of milk if the temperature is maintained at 72° Fahr. As soon as the milk is firmly coagulated it is placed on a cotton covered strainer-rack or in cotton bags to drain. The acidity of the exuding whey at this time should not be over .3% or the flavor of the cheese will be too acid. The draining process requires several hours and should be kept up until all free whey has escaped. Light pressure such as can be obtained in a small cheesepress aids materially in expelling the whey. During the draining process the curd on the outer surface of the strainer should be stirred occasionally to insure even drying. As soon as the curd is sufficiently dry, salt is added at the rate of 2¼ ounces to 10 pounds of curd. At this time the acidity of the whey should be not over .5%. The cheese should then be pressed for a short time to expel excess whey. It is then kneaded by hand and finally pressed into small cylindrical shapes 1¾″ x 2¾″, weighing one-fourth pound each. These are wrapped in parchment paper and tinfoil, and are then ready for market.

Qualities of Neufchatel cheese. Neufchatel cheese should have a distinct, mild, clean flavor resembling well-ripened cream. The texture should be fairly dry, yet smooth and entirely free from lumps. There should be no leaking whey, and each cheese should be neatly wrapped. The cheese will usually keep in good condition for two weeks if kept in a cold place. From 100 pounds of milk about 22 pounds of Neufchatel cheese can be made, which sells for 20 to 40 cents per pound, depending on its quality and the manner of marketing.

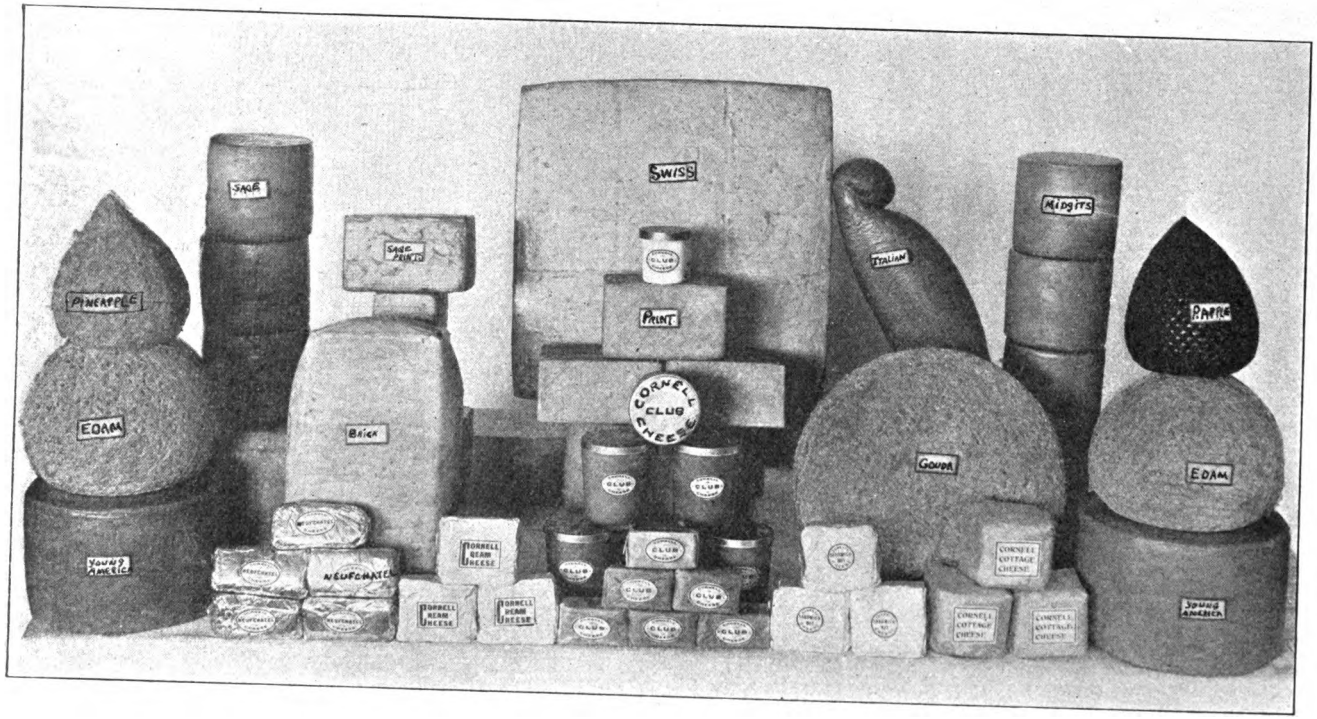


FIG. 1.—*Market cheeses.*

Composition of Neufchatel cheese.

Water	50%
Fat	24%
Proteids	18%
Sugar, lactic acid, etc	5%
Ash	3%
	100%

Precautions to observe in making Neufchatel cheese. The making of Neufchatel cheese is easy and very profitable, but in order to secure a uniformly good product each day strict attention must be given to the control of temperature, acidity and moisture. High temperature, too much rennet, too much acid, too rapid drying and uneven drying all cause lumpy texture. It is very important that the curd be properly coagulated before being placed in the draining process. If it is too soft or breaks up too much in being transferred from the can to the strainer, uneven drying usually results.

FIG. 2.—*Neufchatel cheese mold.*

FIG. 3.—*Cream cheese mold.*

CREAM CHEESE

Cream cheese is one of the most largely used American-made fancy cheeses. Several companies in New York State manufacture it at considerable profit.

Method of manufacture. The method usually followed is similar to that used in making American Neufchatel cheese, except that thin cream testing at least 10% fat is used in place of whole milk. The great disadvantage in this method is the large loss of fat during the manufacturing process. During the long period of coagulation, the fat rises to the top and is very difficult to reincorporate without serious loss. To avoid this loss of fat the following method is now much used with excellent results:

Whole milk is treated in exactly the same manner as in making American Neufchatel cheese. As soon as the curd is sufficiently dry, and before adding the salt, a small amount of well-ripened cream is

mixed with the curd to give it more or less a creamy consistency and to increase its richness. After salting at the rate of 2 ounces for 10 pounds of cheese, it is pressed into rectangular shapes 1¼" x 2¼" x 2¾", and wrapped in parchment paper and tinfoil. These weigh about one-fourth pound, and usually retail for 10 cents each or 40 cents per pound. One hundred pounds of milk plus the added cream will make about 22 pounds cream cheese, so that it yields a large profit.

Average composition of cream cheese.

Water	44%
Fat	40%
Proteid	12%
Sugar, lactic acid, etc	3%
Ash	1%
	100%

Qualities of cream cheese. Cream cheese should be clean in flavor, with a distinct mild aroma resembling fresh butter. It should be of a creamy consistency with plenty of body, but entirely free from lumps. When kept in a cold place cream cheese will remain in good condition for at least 10 days, but deteriorates rapidly in hot weather. It makes a very desirable lunch cheese and is much used for this purpose.

Defects in cream cheese. The defects with their causes and remedies as described under cottage cheese apply with equal importance to Neufchatel and cream cheese.

SANDWICH NUT CHEESE

This style of cheese originated in the Department of Dairy Industry of the New York State College of Agriculture, and is one of the most delicious varieties of soft cheese, being much used in the preparation of cheese sandwiches.

Method of manufacture. To 10 pounds of cream cheese add one-fourth pound of mixed walnuts and almonds. The nuts should first be blanched by soaking in hot water for a few minutes and then removing the dark-colored skins with the fingers. The nuts are ground finely in a meat mincing machine and mixed evenly through the cheese, which is pressed into the regular cream cheese mold and wrapped in parchment paper and tinfoil. These weigh one-fourth pound and retail at 10 cents each or 40 cents per pound.

PEPPER-CREAM CHEESE

This variety of cheese was first suggested by Mr. J. D. Frederickson of Chr. Hansen's Laboratory, Little Falls, N. Y., and is used considerably by those persons who desire spicy food-stuffs.

Method of manufacture. To 10 pounds of American Neufchatel cheese add one-fourth pound to one-half pound of red peppers. The peppers should first be put through a meat mincing machine and ground to a pulp. The cheese and peppers are then mixed and pressed into rectangular shapes, weighing about one-fourth pound. These usually retail at 40 cents per pound and must be kept in a cool place.

CARAWAY POTATO CHEESE

This is a soft cheese, of rather peculiar flavor, due to the method of manufacture and the ingredients used. The process has recently been developed by the Department of Dairy Industry of the New York State College of Agriculture at Cornell University, and is very simple.

Method of manufacture. A small quantity of American Neufchatel cheese is made in the regular way. Before salting, however, mashed boiled potatoes are added at the rate of 1 pound to 1 pound of cheese. Salt is then applied at the rate of 2 ounces for 10 pounds of cheese. A few caraway seeds are sprinkled over the curd and the whole mass thoroughly mixed in a large wooden dish. The cheese is then pressed into suitable shapes, weighing one-fourth pound each, and wrapped in parchment paper. They are ready for use as soon as made but improve if kept in a cool place for a few days.

OLIVE-CREAM CHEESE

This cheese also originated in the Department of Dairy Industry of the New York State College of Agriculture, and is used for the same purposes as Sandwich Nut Cheese.

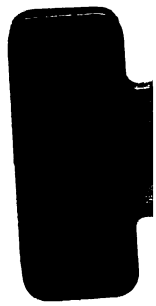
Method of manufacture To 10 pounds of cream cheese add the meat of 2 dozen olives. The olives are first stoned and then ground to a pulp in a meat mincing machine. The cheese and olives are then mixed and pressed into cylindrical shapes similar to American Neufchatel cheese. These weigh about one-fourth pound each and retail for 40 cents per pound. They are wrapped in parchment paper and tinfoil and if kept in a cold place remain in good condition for at least 10 days

CLUB CHEESE

Club cheese is one of the most common varieties of fancy cheese, being manufactured most extensively in Canada, New York and Michigan. For those persons who desire a pronounced flavor and taste, together with a smooth soft texture in cheese, the club variety answers the purpose better than any other. One important quality in club cheese is that it can be spread easily on biscuits or bread, and for this reason it is used on almost every occasion when cheese is served.

Method of manufacture. The method of making club cheese is very simple and yet it requires considerable skill to manufacture a uniformly good product from day to day. The most important factor is the use of suitable raw material, viz., cheddar cheese and butter of good quality. The amount of each of these constituents to be used is determined by the quality of the cheese used and the keeping quality desired in the club cheese.

The method consists in simply grinding up some well-ripened cheddar cheese of good flavor in a meat mincing machine and adding a certain amount of good butter to increase the softness and richness of the cheese. If a fairly strong flavored cheese is desired, cheese six months to one year old should be used, while if a milder taste is preferred, cheese about three months old is better. If the cheese to be ground up is dry in texture, it will require more butter to make it smooth than would be required by a softer cheese containing more moisture. Generally speaking, for home use and for reasonably quick consumption 1 pound butter to 8 pounds cheese make very desirable proportions. The mixture of cheese and butter is usually run through the mincing machine a second time and then kneaded by hand to remove all possibility of lumpiness. In large factories a machine is used for this purpose. Occasionally a small amount of mustard or brandy is added to suit the taste of consumers.

How club cheese is marketed. Club cheese is usually packed in glass or wrapped in tinfoil. When jars are used they should be of a size that can be conveniently used on the dinner-table, or for picnics, lunches, etc.

In packing, the jars are first smeared on the inside with melted butter to prevent air-spaces between the cheese and the glass where mold might grow. The jars are filled to within one-quarter inch of the top covered with plain tinfoil, and then with a tightly fitting cover. When desired in smaller quantities, the cheese can be more profitably put up in small packages, wrapped first in oiled paper and then in tinfoil. Club cheese usually retails for about 40 cents per pound. When stored in a cool place it will keep for some time.